

**CONTAINER FOR PREPARING A COMESTIBLE ARTICLE IN A  
MICROWAVE OVEN, AND A SELF-CONTAINED COMESTIBLE  
ARTICLE UTILIZING THE SAME**

5 **BACKGROUND OF THE INVENTION**

**Field of the Invention**

This invention relates to a container for cooking a comestible material, such as popcorn, in a microwave oven and a self-contained comestible article utilizing the same.

10 **Description of Related Art**

Popcorn is a popular snack food that traditionally is prepared by heating a covered pan containing popping corn and an amount of edible oil over a thermal heat source. With the advent of the microwave oven numerous packages or methods for preparing popcorn in that device are commercially available. Such packages typically have a measured quantity of popcorn kernels and a shortening or butter substitute, such as a partially hydrogenated edible oil, positioned on a microwave susceptor material. These packages are capable of cooking the majority of the initial charge of kernels but leave a few unpopped kernels. The edible oil provides flavoring for the popcorn similar to the flavor of melted butter. The edible oil conducts heat from the susceptor to the kernels and, when melted, also acts as a microwave susceptor. Some of the edible oil remains on the popped kernels and continues to be heated by the microwave energy. This may cause a change in taste and actual scorching or burning if the microwave heating continues for a sufficient time.

In view of the foregoing it is believed advantageous to provide a container that serves to protect first-cooked comestibles from continued exposure to microwave energy.

30 **SUMMARY OF THE INVENTION**

In one aspect this invention is directed to a disposable or reusable container for preparing a comestible material in a microwave oven. The container includes a first portion defining a preparation

chamber and a second portion that defines a storage chamber. At least the portion of the container defining the preparation chamber is transparent to microwave energy.

In accordance with the invention the improvement comprises the storage chamber portion of the container having a microwave shielding material disposed therearound, such that, as a comestible material initially disposed within the preparation chamber is cooked by exposure to microwave energy the comestible material displaces from the preparation chamber into the storage chamber whereat the comestible material is shielded from further exposure to microwave energy by the microwave shielding material.

In the disposable container embodiment the second portion is expandable to define the storage chamber. In the reusable container embodiment the preparation chamber is removable from the storage chamber. In addition a diverter may be provided in the storage chamber.

#### **BRIEF DESCRIPTION OF THE FIGURES**

The invention will be more fully understood from the following detailed description taken in connection with the accompanying drawings which form a part of this application and in which:

Figures 1A and 1B are side elevational views entirely in section of a disposable container for preparing a comestible material in a microwave oven in accordance with the present invention before and after exposure of the comestible material to microwave energy, respectively;

Figures 2A and 2B illustrate a modified version of the disposable container of Figures 1A, 1B before and after exposure of the comestible material to microwave energy, respectively;

Figures 3A and 3B illustrate another modified version of the disposable container of Figures 1A, 1B before and after exposure of the comestible material to microwave energy, respectively;

Figures 4A and 4B illustrate yet another modified version of the disposable container of Figures 1A, 1B before and after exposure of the comestible material to microwave energy, respectively, while Figure 4C illustrates an alternative modification;

Figures 5A and 6A are side elevational views entirely in section of another modified embodiment of a disposable container in accordance with the present invention respectively viewed along orthogonal section lines 5A-5A, 6A-6A prior to the exposure of a comestible article within the container to microwave energy;

Figures 5B and 6B views respectively corresponding to Figures 5A and 6A after exposure of a comestible article within the container to microwave energy; and

Figure 7A and 7B are side elevational views entirely in section of a reusable container in accordance with the present invention before and after exposure of the comestible material to microwave energy, respectively.

### **DETAILED DESCRIPTION OF THE INVENTION**

Throughout the following detailed description similar reference characters refer to similar elements in all figures of the drawings.

With reference to Figures 1A and 1B shown is a disposable container generally indicated by the reference character 10 for preparing a comestible material indicated by the reference C in a microwave oven. Figure 1A illustrates the container 10 in its on-the-shelf configuration while Figure 1B illustrates the configuration of the container 10 after exposure of the comestible material to microwave energy and prior to opening. An optional outer protective wrapping (not shown) may surround the container 10, if desired. In the preferred usage of the present invention the comestible material C is kernels of popping corn in an edible oil, such as partially hydrogenated vegetable oil.

The container 10 includes a first portion 12 and a second, expandable, portion 14. The first portion 12 defines a preparation chamber 16 in which the comestible material C is disposed. The comestible material C may be positioned on an optional layer of a microwave susceptor 20. Any suitable susceptor 20 may be used. The susceptor sold by E. I. du Pont de Nemours and Company, Wilmington, Delaware, under the trademark Mylar OL<sup>®</sup> has been found suitable.

The second portion 14 of the container, when expanded, defines a storage chamber 18 (Figure 1B) in which the cooked comestible material

is held. An optional support base 24 may be provided on the bottom of the container 10 to elevate the susceptor material 20 above the bottom wall of the microwave oven. The support base 24 (if used) may be implemented in any convenient fashion such as shown by 24, 24'.

5           At least the first portion 12 of the container 10 is fabricated from a material that is substantially transparent to microwave energy. A suitable material such as paper, paper board, or a paper board-polymer laminate, such as a paper board-polyester terephthalate (PET) laminate, or other material having sufficient thermal stability at cooking temperatures, may  
10   be used.

          In accordance with the present invention the expandable portion 14 of the container 10 that forms the storage chamber 18 is fabricated from or has a microwave shielding material 28 disposed thereon. A preferred shielding material for the expandable portion 14 is an aluminum-coated  
15   polyester terephthalate (PET). As shown in Figure 1C, the aluminum coating 28' may be disposed on the exterior (or interior) of a support layer 26 of the expandable portion 14. As seen in Figure 1D, a thin sheet of aluminum foil 28" may alternately be used. The expandable portion 14 of the container 10 is folded so that in the on-the-shelf configuration (Figure  
20   1A) it closely overlies the preparation chamber 16 and the comestible material C therein. The expandable portion 14 of the container 10 is attached on or in the vicinity of the upper edge 12E of the first portion 12 using a suitable adhesive 30. A vent 14V, such as a small hole in the expandable portion 14, may be provided to allow excess water vapor to  
25   escape after exposure of the comestible material to microwave energy.

          In use, the container 10 is introduced into a microwave oven and the oven is activated. As the comestible material C within the preparation chamber 16 is cooked by exposure to microwave energy it increases in volume and displaces from the preparation chamber 16. The expandable  
30   portion 14 of the container 10 responds to the increase in volume and displacement of the cooked comestible material, indicated by the reference character C', by unfolding to define the expandable storage chamber 18. The cooked comestible material C' (Figure 1B) that

displaces into the storage chamber 18 is shielded from further exposure to microwave energy by the microwave shielding material 28.

The container of the present invention is believed advantageous because without the presence of the microwave shielding material 28  
5 surrounding the storage chamber 18, kernels that "pop" early in the cooking cycle would continue to be heated by microwave energy. Without the protection afforded by the microwave shielding material 28, continued heating would tend to scorch the first-"popped" kernels.

Figures 2A and 2B show a modified version of the disposable  
10 container 10 in which the first portion 12 is extended both to enlarge the preparation chamber 16 and to define a hollow conduit 32 that connects the preparation chamber 16 to the storage chamber 18. In use, the earliest-cooked kernels accumulate within the enlarged preparation chamber 16. These kernels are sequentially displaced by later-cooked  
15 kernels from the preparation chamber 16 into contact with the expandable portion 14, causing the same to enlarge to form the storage chamber 18.

Depending upon the location of the adhesive attachment 30 between the expandable portion 14 and the first portion 12 of the container some of the microwave shielding material may be disposed  
20 around a region of the hollow conduit 32. This region of the conduit 32 may also afford protection to cooked kernels from continued exposure to microwave energy. This relationship is made clear in Figure 2B where the upper region of the conduit 32 projects into the storage chamber 18. This projecting portion 34 of the conduit 32 serves as a barrier that retains  
25 comestible material cooked by exposure to microwave energy within the storage chamber 18.

A further alternative modification to the container 10 is illustrated in Figures 3A and 3B. In this arrangement the projecting portion 34 of the conduit 32 is configured to prevent the entry of substantially all microwave  
30 energy into the storage chamber 18. In the arrangement shown the projecting portion 34 tapers from the preparation chamber toward the storage chamber 18.

Yet another modification to the container 10 is illustrated in Figures 4A and 4B. In this arrangement a collapsible annular shelf 38 is attached

to the upper edge 32E of the conduit 32. The left hand portion of Figure 4A illustrates the shelf 38 in the collapsed configuration, while the right hand portion of that Figure illustrates the shelf 38 in the extended configuration. The expandable portion 14 of the container 10 is adhered  
5 near the perimeter of the shelf 38 by a suitable adhesive 30. The location of the attachment between the expandable portion 14 and the shelf 38 serves to enlarge the available volume of the storage chamber 18 when the same is generated.

If it desired that the upper region of the conduit 32 project into the  
10 storage chamber 18 (as in Figures 2B, 3B) it is necessary only to lower the attachment point of the shelf 38 to the conduit 32. This alternative is illustrated by the extending portion 34 in Figure 4C.

Yet another modification to the container 10 is illustrated in Figures 5A and 6A (before exposure to microwave energy) and in Figures 5B and  
15 6B (after exposure to microwave energy). In this arrangement the container 10 includes a first portion 12 and a second, expandable, portion 14 in the form of a collapsed folded bag. The first portion 12 defines a preparation chamber 16 in which the comestible material C is disposed. The comestible material C may be positioned on an optional layer of a  
20 microwave susceptor 20. The paper support layer 26 of the expandable portion 14 has the shield material 28 coated or laminated onto the interior (or exterior) thereof.

When exposed to microwave energy the comestible material increases in volume and displaces from the preparation chamber 16 into  
25 contact with the expandable portion 14, causing the same to enlarge to form the storage chamber 18. A vent 14V may be provided, as discussed in conjunction with Figures 1A, 1B.

The present invention may also be implemented in the form of a reusable container 110, as illustrated in Figures 7A and 7B. The reusable  
30 container 110 comprises an upper portion 112 defining a preparation chamber 116 and a lower portion 114 defining a storage chamber 118. The preparation chamber 116 may be connected to or supported by a support member 113. The upper portion 112 of the container defining the preparation chamber 116 is transparent to microwave energy. The

preparation chamber 116 may comprise an annular recess 117 (see Fig. 7B) for receiving the comestible material. An optional susceptor 120 may be positioned in the preparation chamber 116.

5 The lower portion 114 may be constructed of a material that provides an integral shielding function for the storage chamber 118. Alternatively the lower portion 114 may have a shielding material 128 layered thereon. On the right-hand side of Figure 7A the shielding 128 is shown on the inside of the lower portion 114 while on the left-hand side of Figure 7A the shielding 128' is shown on the outside of the lower portion  
10 114.

A hollow conduit 124 may connect the preparation chamber 116 to the storage chamber 118. The hollow conduit may be tapered as shown and may be configured to attenuate microwave energy thereby to prevent the entry of substantially all the microwave energy into the storage  
15 chamber, such as by having a layer of shielding material 128 thereon.

In operation the preparation chamber 116 receives the charge of popcorn C and an edible oil (see Figure 7A). When the comestible material C initially disposed within the preparation chamber 116 is cooked by exposure to microwave energy the cooked comestible material C' (see  
20 Figure 7B) displaces from the preparation chamber into the storage chamber 118 whereat the cooked comestible material C' is shielded from further exposure to microwave energy by the microwave shielding material 128. A diverter or deflector of a suitable shape 130, 130' may be positioned to divert the cooked comestible material C' and thus distribute  
25 it within the storage chamber 118.